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Field of the invention

The present invention relates to an auxiliary device for editing a document, especially to

an auxiliary device connected to a computer peripheral for facilitating the document-

editing task. Therefore, a user can directly use the modular key set to edit a document

without invoking a key chording (memorize the combination keys) or heavily use a

mouse.

Background of the invention

Computer hardware and software have made rapid progress as the processing speed

of computers is growing faster. However, document-editing tools have made insufficient

development when compared with the progress of computer hardware and software.

In general, the document-editing task by computer is achieved by typing with a

keyboard and with the help of a mouse. The typing and editing of documents require

frequent operation of the keyboard and mouse. It is easy for the person typing and editing

to develop industrial ailments.

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Ergonomic keyboards have been developed to overcome these problems. However, the prior art ergonomic keyboards still require heavy use of the mouse.

In order to solve the problems inherent with ergonomic keyboards, some specific function keys have been added to keyboards. For example, the traditional IBM keyboards, which had 83 – 84 keys, have been expanded to 104 – 105 keys, including "Insert", "Delete", "Home", "End", "Page Up", "Page Down", "Up", "Down", "Left", "Right", and so forth. For discrimination purposes, the extended code "E0" is added in front of the original key codes, such as the key codes of the keys in the Num Lock region. Thereby, function keys can be added, moreover, some keyboard manufactures have developed multimedia keyboards, wherein a plurality hot keys (for example: CD, Video, Play, Fast Forward, Fast Rewind, Volume +, Volume-, Mute, WWW, Email,.. etc) are incorporated on the standard keyboard and a specific driver has also been developed for operating this keyboard in Windows environments.(United States Patent No. 6011495; filed by the same inventor) When a user presses a specific hot key, the keyboard will send a standard Windows defined extend scan to the system and a specific function is executed. However, the multimedia keyboard (traditional hot key keyboard) still has the following problems:

1. The number of hot keys is limited by keyboard free area, space or scan code and twenty hot keys are nearly a maximum.

2. A driver program is required (Require to call Windows operation System standard "API WinExec O" function), which occupies system resource and reduces

operation speed. The installation of software and compatibility of software are also problems.

3. Almost all the hot key functions are defined by Microsoft Corp. and will transfer a standard extend scan code to the Windows OS for launching target applications. But the functions are without the capability to control some functions (Application internal functions) that Windows has not defined (for example: Cut, Paste, copy, New, Open, Save, Reply, Send, Undo, Redo, etc).

At present, the popular Microsoft Office software has provided tools including word, excel, power point etc. Those programs enable a user to finish documents like personal and commercial letters, spread sheet and presentation data. However, in editing the above documents, the user still needs to operate the keyboard, heavily use the mouse or frequently use key chording to perform certain editing operations. It is still inconvenient for user. For example, to use the "Send" function, the user must memorize the chording keys "ALT+S", holding the ALT key and then pressing the S key to launch the "Send" function. It is not easy for everyone to remember very many chording key combinations.

United States Patent Application Publication No. 2003/0043121 A1 (filed by the same inventor) further adds one multimedia point device (wheel) for keyboard and mouse functionality performed at the same time. This system allows the keyboard and mouse to utilize a special wheel for launching software pop-up menus. The user can select the pop-up menu select items for launch functions. However, the direct access

key added in the keyboard or mouse is the best way and easiest for use (one-press

launch function).

Summary of the invention

It is an object of the present invention to provide an auxiliary device for editing a

document and to enable a user to directly edit the document on a Windows[®] operation

PC system peripheral input device. A modular key set is arranged on the Windows[®]

operation PC system peripheral and connected to an I/O bus of the single-chip

microprocessor. The modular key set is composed of function keys such as cut key,

paste key, copy key, mark key, etc. The user uses the mark key to mark a segment of

the document, the cut key to cut the document segment in the marked region, and the up

arrow, down arrow, left arrow and right arrow to move the cursor to a specific region.

Afterward, the user can use the paste key or the copy key to paste or copy the selected

document segment/files to the position of cursor. Therefore, the user can directly use

the modular key set to edit the document without invoking key chording or heavy use of

the mouse (moving mouse and serial clicking for select application software key

functions or select a specific region).

It is another object of the present invention to provide an auxiliary device for

editing a document, wherein the user can perform a specific function by pressing only

one key without invoking key chording or heavy use of the mouse. The moving times

and ranges of the user's hand between the keyboard and the mouse can be saved.

It is still another object of the present invention to provide an auxiliary device for editing a document, which does not require any support of a complex driver program. Therefore, the auxiliary device for editing a document does not have the problem of software compatibility. This is different from the conventional (traditional) hot key, which requires support of a complex driver program.

It is still another object of the present invention to provide an auxiliary device for editing a document, which is independent of keyboards for various countries. For example, the redo and undo operation can be executed by typing CTRL+Z (hold CTRL key while pressing Z key) and CTRL+Y (hold CTRL key while pressing Y key), respectively. However, the alphabet arrangements on keyboards are different for different countries. For a German keyboard, the positions of "Z key" and "Y key" are opposite to those of an English keyboard (the "Z key" and "Y key" said as moving key). As shown in Figs. 1 and 2, different functions will be executed for these two types of keyboards while pressing the same key combination. Therefore, the chording keys cannot be arbitrarily assigned (not easy to memorize) and the non-moving alphabet key for all countries is the best choice.

The various objects and advantages of the present invention will be more readily understood from the following detailed description when read in conjunction with the appended drawing, in which:

Brief description of drawing:

Fig. 1 shows the top view of a German keyboard;

Fig. 2 shows the top view of an English keyboard;

Fig. 3 shows the perspective view of the present invention;

Fig. 4 shows the block diagram of the present invention;

Fig. 5 shows the flowchart of operation of the single-chip microprocessor of the

present invention;

Fig. 6 shows the table of key codes for multiple keys corresponding to the

individual keys of the present invention;

Fig. 7 shows the perspective view of another preferred embodiment of the present

invention

Fig. 8 shows the application of the present invention to a Windows keyboard.

Description of the Invention

As shown in Figs. 3 and 4, the present invention provides a demo auxiliary device

for editing a document, which comprises a Windows® operating PC system peripheral

input device 1 and a modular key set 2 with a document editing function.

In the preferred embodiment of the present invention, the Windows® operating PC

system peripheral 1 is a keyboard having a single-chip microprocessor 11 in the internal

circuit thereof (shown in Fig. 4).

The modular key set 2 is placed beside the arrow keys on the keyboard (shown in

Figs. 3) and is connected to the I/O bus of the single-chip microprocessor 11 in the internal circuit of the keyboard. The modular key set 2 is composed of function keys such as cut key 22, paste key 21, copy key 23 and mark key 24.

The user uses the mark key 24 to mark a segment of document or files, the cut key 22 to cut the document segment in the marked region, and up arrow, down arrow, left arrow and right arrow to move the cursor to a specific region or mark files. Afterward, the user can use the paste key 21 or the copy key 23 to paste/copy the selected document segment to the position of the cursor or moving files.

When the user presses any key in the modular key set 2, the single-chip microprocessor 11 detects the keystroke of the key in the modular key set 2 and generates a pseudo composite-key (chording or key combinations) code. Fig. 6 shows the relationship between the function keys in the modular key set 2 corresponding to the composite-keys (chording/key combinations). As can be seen from the figure, the composite keys (chording) corresponding to the cut key 22 is CTRL+X, the composite keys (chording) corresponding to the paste key 21 is CTRL+V (pressing one key to imitate that corresponds to holding the CTRL key pressed and pressing the V key, then releasing both keys simultaneously) or ALT+E, P (pressing one key to imitate that corresponds to holding the ALT key pressed and pressing the E key, then releasing both keys simultaneously, and then pressing the P key), the composite keys corresponding to the copy key 23 is CTRL+C, and the composite keys corresponding to the mark key 24 is left Shift holding or right Shift holding.

A different computer/ Windows[®] operation System may have different processing speeds; therefore, the microprocessor 11 may generate the pseudo composite-key code (chording/ key combinations) with a different compared to the generating speed of an ordinary key (standard key). In the preferred embodiment of the present invention, the separation between the issuing of pseudo composite-key codes (chording/key combinations) corresponding to the function keys in the modular key set 2 is at least 1.5 to 2 ms. Otherwise, a few Windows[®] operation System may malfunction and lose pseudo composite-key information.

Fig. 5 shows the flowchart of the microprocessor 11 in the preferred embodiment of the present invention.

After step 30 of powering on the computer (start Windows[®] operation System), the microprocessor 11 is first in a reset state (step 31) and then begins a security test (step 32). Afterward, if a command is sent to the microprocessor 11 in step 33, the microprocessor 11 executes the command in step 331 and in step 332 the microprocessor 11 judges whether the scan counter time has ended (time out). If the scan counter time has not ended, the microprocessor 11 judges whether the flag time has ended in step 34. If the flag time is has ended, the key code is sent in step 35, else the procedure goes back to step 33.

If the scan counter time has ended, the microprocessor 11 scans each key in step 36 and judges whether a function key has been pressed in step 37.

If no function key was pressed, the procedure goes back to step 33, else the

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microprocessor 11 judges whether any key in the modular key set 2 was pressed in step 38.

If no key in the modular key set 2 has been pressed, the flag corresponding to that state is stored in a buffer in step 382 and then the procedure goes back to step 33. If a certain key in the modular key set 2 was pressed, the flag corresponding to that state is set in step 381 and stored in the buffer in step 382.

With reference now to Fig. 7, in another preferred embodiment of the present invention, a extra adding switch key 3 is provided on the left-top corner of the keyboard 1 and the extra adding switch key 3 is connected to the I/O bus of the microprocessor 11. The extra adding switch key 3 is used to switch the mode of the function keys F1-F12 between their ordinary function and an augmentation function. The augmentation functions of the modular key set includes redo, undo, open, new, bold, save, find, forward, send, etc. In other words, the microprocessor 11 has two different key tables (one for standard codes and another for generating chording/key combinations) to switch the function of the function keys F1-F12 between the ordinary function and the augmentation function. The function of the function keys F1-F12 can be expanded while no new keys are necessary.

When the extra adding switch key 3 is pressed, the function keys F1-F12 have the augmentation function as shown in Fig. 6. As can be seen from the table, the composite-key (combination key) code for redo is ALT+E, R, CTRL+Y; the composite-key (combination key) code for undo is ALT+E, U, CTRL+Z; the composite-key

(chording/combination keys code for open is CTRL I O or ALT+F, O; the composite-key
(chording/combination key) code for new is CTRL+N or ALT+F, N; the composite-key
(chording) code for change to bold form or normal form is CTRL+B; the composite-
key (chording/combination key) code for save is CTRL+S or ALT+F, S; the composite-
key (chording/combination keys) code for find is CTRL+F or ALT+E, F; the
composite-key (combination key) code for forward file is ALT+F, D or CTRL+F; and
the composite-key (chording) code for send file is ALT+S.

If the extra adding switch key 3 is pressed again, the function keys F1-F12 are
switched back to their ordinary functions. The state of the extra adding switch key 3
status can be manifested by adding an additional light-emitting indicator 5 (shown in
Figs.7 and 8). The "F1-F12" function keys are less in use while working on Windows®
operation System, so the augmentation function locate in "F1-F12" is the best way.

The code conversion of the composite-key (chording/combination key) code in the
present invention can be embodied by sending any specific code (from a device) to
code-conversion application software (driver), the code-conversion application software
(driver) will transfer the specific code to composite-key (chording/combination key)
code information to Windows® operation System, it just share minimum Windows®
operation System resource only. Thus enabling or disabling the key code transfer of the
function keys F1-F12.

Moreover, in still another embodiment of the present invention, a short-cut key (or
launch key) 4 is provided. The short-cut key 4 is connected to the I/O bus of the

microprocessor 11. As shown in Fig. 6, the code corresponding to the short-cut key 4 is

CRTL+ALT+ specific non-moving key.

When a user presses the short-cut key 4, he can execute any programs without any

driver program. For example, the user can open the properties of a program on the

desktop while Windows® operating system is being actuated. In the short-cut section,

the user presses the short-cut key 4 and selects confirm to associate the program with

the short-cut key 4. Afterward, the user can directly press the short-cut key 4 to launch

the program.

As showing Fig. 8, the present invention can also be applied to a Windows

keyboard.

To sum up, the auxiliary device for editing document has following advantages:

(1) The user can directly use the modular key set to edit documents without

invoking conventional chording key combinations or heavy use of the mouse wile

working on Windows® operating system.

(2) The modular key set can be operated as a stand-alone device as it does need the

support of code-conversion application software and just share less Windows®

operating system resource. Therefore, the modular key set does not have the problem of

software compatibility.

(3) The user can use the short-cut key to start any function that has been associated

with the short-cut key. It is very convenient.

(4) If builds with keyboard, it does not require enlargement space or adding

complex hardware.

(5) The user can directly use the modular key set, just press one button for launch

application internal functions (for example : new, open, save, cut, paste, copy,

mark, undo, redo, F'ward, send, find, bold).

Although the present invention has been described with reference to the preferred

embodiment thereof, it will be understood that the invention is not limited to the details

thereof. Various substitutions and modifications have been suggested in the foregoing

description, and others will occur to those of ordinary skill in the art. Therefore, all such

substitutions and modifications are intended to be embraced within the scope of the

invention as defined in the appended claims.